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ABSTRACT

One of a series of materials developed by Project APT (Administrators, Parents, and Teachers/Assessment, Programing, and Training), a program designed to foster home/school coordination in educational planning and program implementation for severely mentally retarded and/or multiply handicapped students; the booklet focuses on lifting and transferring techniques for use with physically handicapped students. Section 1 describes body mechanics and safety techniques such as methods of reaching and pushing and pulling. Exercises for developing better posture are discussed in Section 2. Methods of lifting, carrying, and transferring students, emphasizing alternatives for use with cerebral palsied children and wheelchair transfers, are outlined in the third section. A short list of addresses for further information is included. (PHR)

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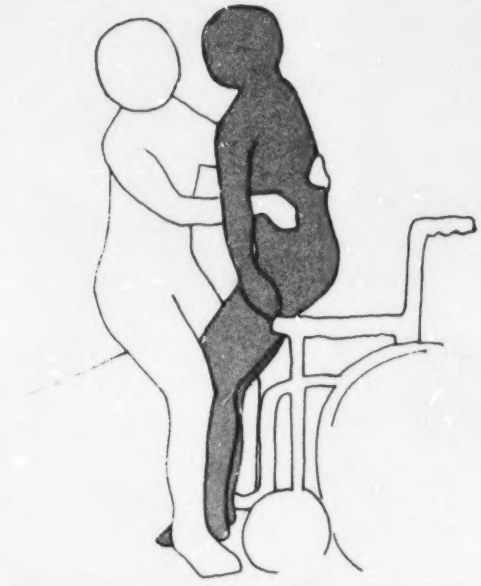
LIFTING AND TRANSFERRING MADE EASY



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It is essential that individuals who work with physically involved students have a basic knowledge of body mechanics and various lifting and transferring techniques. This is important for the safety of both the student and the person(s) performing the transfer and for preventing damage to any equipment. The following sections will:

1. Define good body mechanics.
2. Describe some exercises for developing better posture and a stronger back.
3. Provide examples of various ways students may be lifted, carried, and transferred.

If you have access to physical or occupational therapists, it would be a good idea to seek their help before trying any of these techniques. Also, be sure to report any injuries to a student or staff member incurred during a transfer to the appropriate person and consult a physician if necessary.

BODY MECHANICS AND SAFETY TECHNIQUES

Body Mechanics and Safety Techniques

Safety is a combination of practiced skills, experience, and thoughtful actions, which, when applied, can reduce and prevent accidents. The best protection against accidents and injury is to learn as much as possible about good posture and proper body mechanics. The application of this knowledge through training and practice can establish safe routines for carrying out responsibilities. The result can be a safe and pleasant working environment.

Safety techniques accomplish two purposes:

1. They safeguard the person carrying out the activity.
2. They safeguard the object or person being moved.

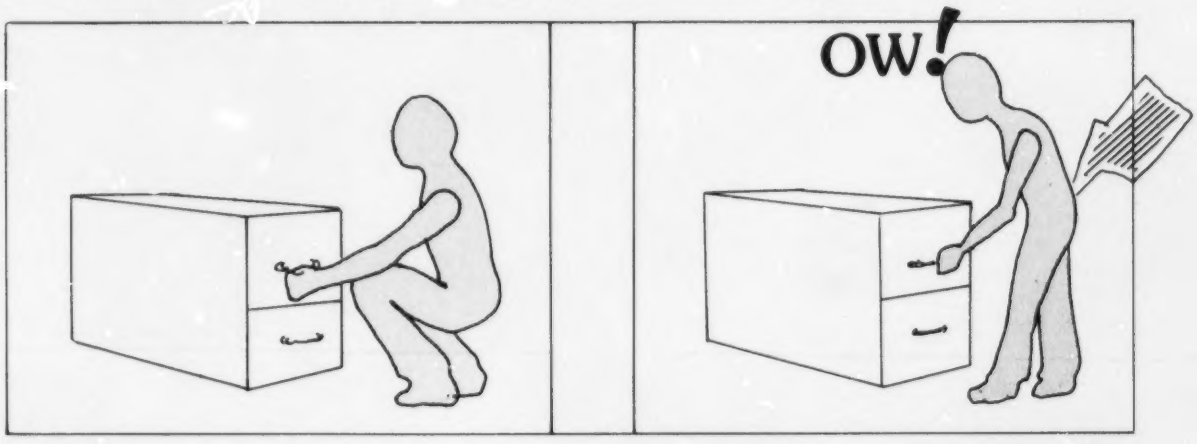
Principles of Good Body Mechanics

Center of Gravity	This is the point at which the greatest mass of the body is centered. It lies just in front of the upper part of the hips.
Base of Support	The manner in which the feet are placed in relation to the center of gravity has a great effect on the stability of the body. The area formed between the feet can be considered the base of support. The broader the base and the lower the center of gravity, the more stable the stance.
Line of Gravity	The line of gravity is the vertical extension of the center of gravity. The line of gravity can be thought of as passing through the body and falling between the feet. If this line passes through the center of the base of support, stability is greatest. If the line of gravity is away from the center of the base of support, the body becomes unstable.
Weight	If an action is performed away from the base of support, body weight is then displaced and muscles will attempt to counteract the action. This will enable the body to establish a new base of support to carry out the action.

An understanding of these basic principles and the application of them will supply the stability needed, thereby conserving energy and reducing unnecessary fatigue.

BENDING

There is a right and a wrong way to bend, from the point of view of preventing back strain. Squatting instead of bending from the waist allows the upper portion of the body to remain erect while the large joints and the powerful muscles of the legs do the work.

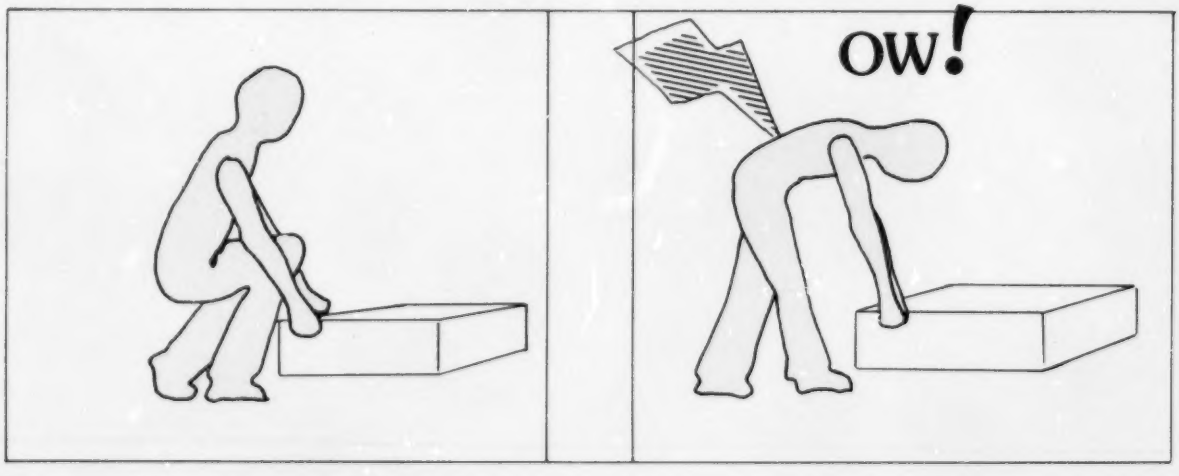


Good: The squatting position is favorable. The work of lowering the body is controlled by the leg muscles. Placing one foot ahead of the other provides a stable base of support.

Poor: The maximal stress is placed on the spine and hip extensor muscles. The gravitational pull of the trunk is great, and the knees and ankles contribute little to the work. If trunk flexion must be done in this manner, rest one elbow on the thigh for support.

LIFTING

One should prepare to lift an object by getting as close to it as possible. Lifting a load from the floor to a shelf essentially reverses the process of stooping and the same principles apply; the work is shared by all lower extremities while the trunk remains erect. If the elbows are fully extended, the chance of fatigue in the arm muscles will be decreased.

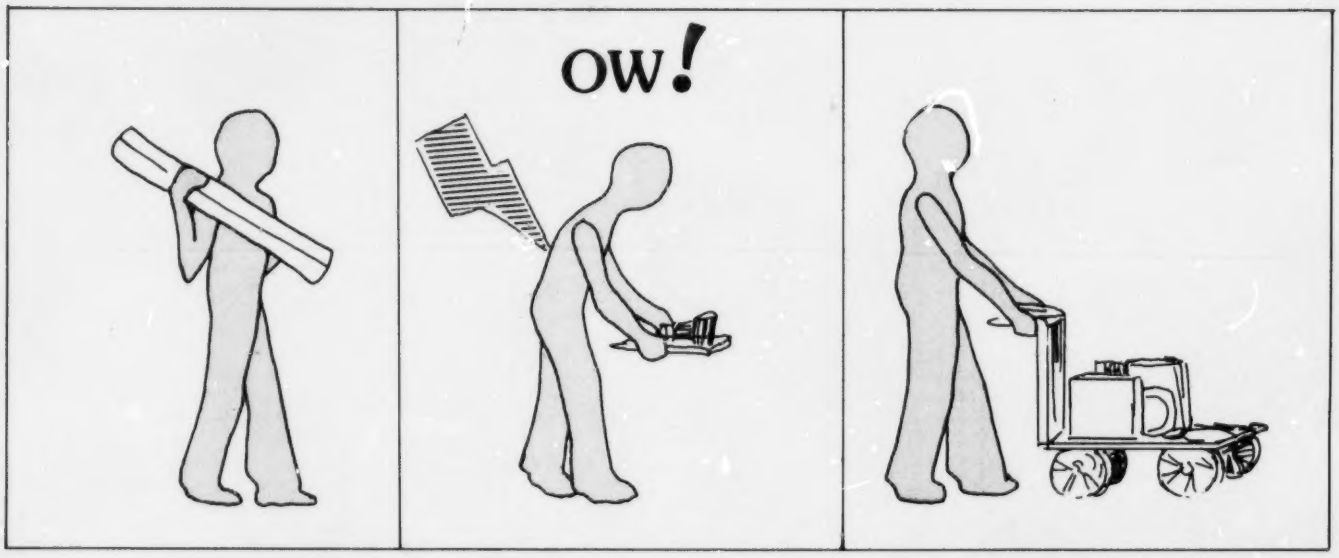


Good: The load is lifted with the assistance of all the major joints of the lower limbs. The load is kept as close to the body as is possible. A good base of support is maintained.

Poor: The work is done by the back muscles and the hip extensors. This is dangerous and can cause strain and injury.

CARRYING

The main precaution in carrying is to keep the load as near as possible to the midline of the body. Carrying objects on top of the head is ideal but is not often practical. Resting a load on the shoulder is advantageous if it is not too heavy. It is wasteful to lift a very heavy object any higher off the floor than necessary. Walking quickly for short distances will reduce the length of time the object must be supported. The load should be shifted from time to time so that the muscles may have a chance to rotate their activity, avoiding fatigue. If the load is too heavy, transport it in a wheelchair, on a dolly, or other conveyance.



Good: The load is being carried near the midline of the body. The spine is erect.

Poor: The upper part of the body must shift backward to adjust to the added weight. This puts strain on the low back and abdomen.

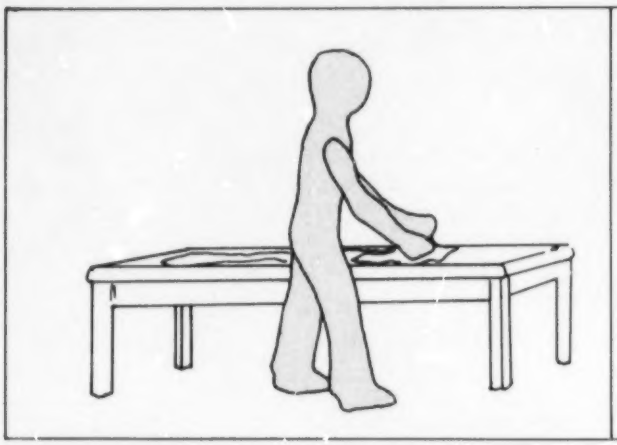
Smart: Place heavy loads that have to be moved long distances or put down frequently, on a cart, etc., for transportation.

REACHING

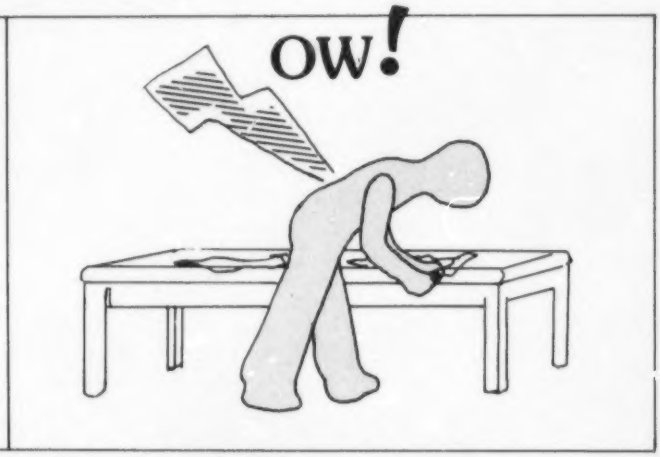
THE FARTHER OUT WE MUST REACH, THE MORE STRAIN THERE IS ON THE BODY. The feet should be spread to broaden the base of support. Advance one foot forward in the direction of the reach. This will help provide a more stable standing position. When reaching, it is important to keep your center of gravity in front of you. If the load is too high and too heavy, you can fall backward, which may result in injury.

SAFE RANGE OF REACH

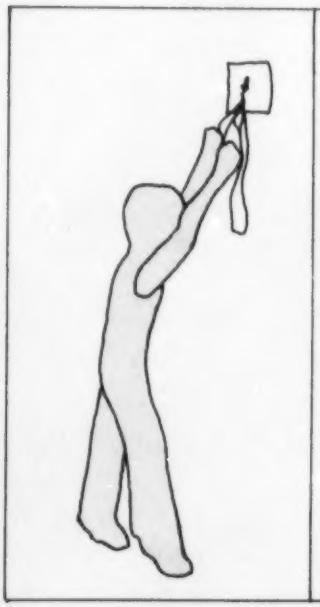
In order to move a child out of bed, feed or bathe him or her, etc., move the child near you to minimize the necessity of bending over, and avoiding prolonged strain on your back.



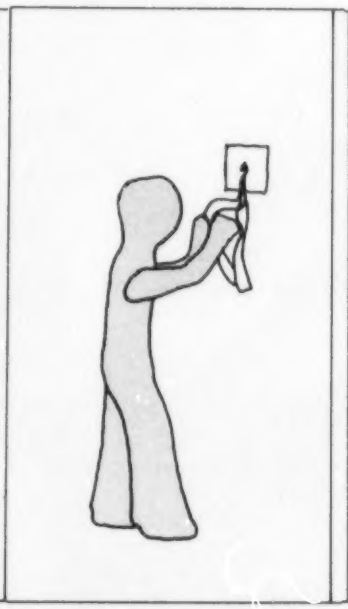
Good: One foot is placed forward so that the trunk may remain reasonably erect; the height of the table or bed is convenient.



Poor: The trunk is bent forward from the hips. The placement of the feet is poor for backward and forward weight shifting. Back fatigue can develop.



Good: Energy is conserved by convenient placement of equipment.



Poor: Unnecessary effort is required in reaching equipment. Poor body mechanics are involved. Strain can occur.

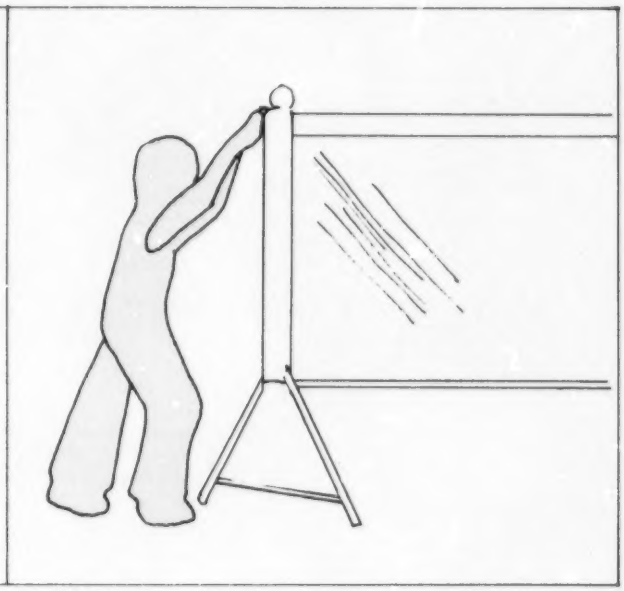
Poor: A heavy load too high up can result in injury to the back or the danger of dropping the object on yourself. A small stool can eliminate this hazard.

PUSHING AND PULLING

In moving an object, as much force as possible should be applied in the direction of the movement. Downward pressure will increase the friction, and the energy for pushing will be partially wasted. In some situations a slight upward or lifting force will decrease the friction. Leaning toward the object when pushing adds the same effect as leaning away does when pulling. In pushing or pulling, the trunk muscles are "set" or held fixed, and the legs do the work.

A good rule to remember in pushing is to exert a force in line with the middle of the object whenever possible rather than near the top or bottom. A very heavy object can be moved by placing your back up against it, leaning with the body weight, and pushing by extending the legs. The position protects the back against strain.

Good: The handles of the table are placed near the center of gravity. The trunk muscles are "set" and the legs do the work.



Poor: The force to move the object is applied too high. The object can be tipped over or the low back can be strained.

The preceding material was taken from: *Safety and Body Mechanics* by Sam Feitelberg, R.P.T.

EXERCISES FOR DEVELOPING BETTER POSTURE

Exercises For Developing Better Posture

Williams Low Back Exercises

Purpose: To strengthen the abdominal muscles and to stretch back extensor muscles.

If there is a physical therapist available, consult with him or her before doing these exercises. They are not intended as a substitute for consulting a physician in case of back injury or chronic pain.

Exercise 1. Knees to Chest

Starting position—Lying on back on firm surface, knees together and bent, and feet flat on floor.

a) Draw right knee in towards chest, hold it in with right hand.
b) Without letting go of right leg, pull left leg in towards chest, holding it with the left hand.
c) With both knees drawn up, pull both knees together with the hands, attempting to touch the knees to the chest, progressing to where you can bring the chin up to the knees. Hold for count of five.
d) Release right knee without letting go of the left leg, returning back to the starting position. Bring the left leg down to the starting position.

Exercise 2. Pelvic Tilt

Starting position—Lying on back with knees bent and feet flat on floor.

a) Tighten the buttocks muscles, squeezing them together while also bearing down with abdominal muscles. Bring the low back down flat on the floor so that you cannot slide your hand through the low part of the back.
b) Hold for count of five.
c) Relax, return to starting position.

Exercise 3. Curls

Starting position—Lying on back with knees bent and feet flat on floor.

a) Curl up, keeping the chin tucked. Try to bring the head and shoulder blades off the floor with arms at your side or folded across your chest.
b) Return to starting position, letting the head come down last.

Exercise 4. Sit-ups

Starting position—Lying on back with knees bent and feet flat on floor, arms folded across chest, and with someone holding your feet down or with feet slipped under a heavy piece of furniture, such as a sofa.

a) Pull the stomach in and flatten the arch of the low back (pelvic tilt). Raise the head, then the shoulders, and then the back, from the floor, curling up to a sitting position. Hold for count of five.
b) Return to starting position, by curling back down, touching the *low back first*, then the upper back, and finally the head, to the floor. Do exercise slowly.

Exercise 5. Back Extension

Starting position—Lying on stomach with two or three cushions or pillows under the hips, hands folded behind back, and with someone holding your legs down or with legs slipped under a heavy piece of furniture, such as a sofa.

a) Raise the upper part of the body until it is level with the hips and legs. Hold for count of three.
b) Return to starting position. Use caution with this exercise; it is quite strenuous.

Rules For Protecting Your Back

1. The spine should be maintained in an erect position. Forward bending should be kept to a minimum.

2. Muscles used in handling a weight should be properly "set" or ready. A good many injuries result when an object being lifted or moved proves to be heavier than expected.

3. Motions should be smooth and steady, never jerky or sudden.

4. Do not lift while twisting your back or if your body is in an awkward position.

5. Muscles not required for an activity should remain relaxed to avoid unnecessary fatigue.

6. When a position of strain must be taken, rest frequently or support the body whenever possible.

7. Lift with your legs, keeping the load as close to you as possible.

8. Do not stoop over. Flex (bend) your knees.

9. When carrying, the load should be supported near the midline of the body.

10. Try not to push or pull objects which are over your head.

11. When reaching, keep feet well apart, or put one in front of the other.

12. When you must stand in one spot for extended periods, as with ironing, raise one foot on a footstool. (Or sit if possible.)

13. Stand as erect as possible—*with a flattened back.*

14. When sitting, the hips, knees, and ankles all should be at right angles. The spine should be supported.

15. Stand or sit close to whatever you are working on.

16. The working surface should be of proper height to keep the spine as erect as possible. There should be enough room under tables, and table braces should not be in a position to limit a proper stance.

17. Equipment used should be of proper design to allow for easy handling, e.g., properly placed handles, casters that are large enough for smooth transportation.

18. Working areas should be designed to minimize strain.

19. Time must be taken to think about:

    a) Your physical position in relation to the object to be lifted and/or moved.

    b) The weight, size, and mobility of the object to be lifted and/or moved.

    c) The safest way to transport the object by using other equipment—wheelchair, stretcher, dolly, etc.—if it cannot be moved alone or help is not available.

LIFTING, CARRYING AND TRANSFERRING STUDENTS

LIFTING AND CARRYING SMALL PHYSICALLY INVOLVED STUDENTS

- If there is a physical or occupational therapist available, consult with him or her for suggestions as to the best way to transfer certain students.

There are many ways to lift and carry smaller physically involved students depending on the child's involvement, the ability of the person doing the lifting, and the situation. However, the principles remain basically the same:

1. Always use good body mechanics and transferring techniques.
2. Know where you are going before lifting the student.
3. Try to have the student as relaxed as possible and in a good position before being lifted. Since many children with cerebral palsy have very stiff hips (they are straight or extended) when lying on their backs, it is important to try to break up this pattern of extension by bending or flexing their hips. If it is very difficult to flex the child's hips, you may need to flex the head forward on the chest and bring the shoulders forward at the same time. For the slightly larger child, the easiest way to do this is to roll the child on the side, flex the hips and neck, and curl the child up to a sitting position before lifting. It is also important to keep this "flexed" position in mind when carrying a child. For example, if a child's legs are very straight, and clasped tightly together, you might want to carry him or her in a position that would bend the legs and separate them.
4. Provide adequate support for children with poor head and trunk control, joint deformities, or fragile limbs. However, be careful not to oversupport—use a position that allows a child to do as much independent "work" as possible safely. For example, a child who has some head and trunk control could improve this skill by being carried in a position straddling someone's hip rather than being cradled in the arms. This also provides a better vantage point from which the child may look around at the environment.

The following illustrations, taken from Nancie Finnie's book *Handling the Young Cerebral Palsied Child at Home,* provide some examples of ways to lift and carry handicapped children.

INCORRECT LIFTING AND CARRYING POSITIONS FOR THE CEREBRAL PALSIED CHILD

This is an incorrect way to lift a severely extended child. By not paying any attention to the tightness in the child's arms and legs and the lack of head and trunk control, you force him or her into a non-functional position, which only increases the child's problems. As a result, it is very difficult to carry him or her, and the child begins to look like this:

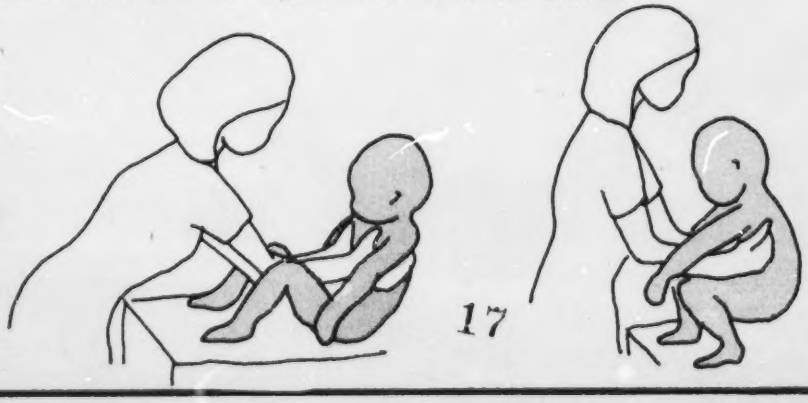
This child cannot use his or her arms and has difficulty interacting with the environment.

This cerebral palsied child is carried as a baby, completely supported and unable to look around. When carrying a child in this way you have the tendency to pull him or her towards you, especially at the hips. This is an abnormal position similar to that which the child adopts while lying on the back. He or she is, again, unable to use his or her arms or interact with the environment.

A "floppy child" carried in the manner will tend to be completely passive.

BETTER ALTERNATIVES FOR CARRYING THE CEREBRAL PALSIED CHILD

For the young child who is predominantly extended: First bring him or her up into a sitting position, controlling the child at the shoulders and holding under the tops of the arms, which should be lifted and turned out. This will help bring the head and arms forward and facilitate the bending of the hips and knees; your forearms help to keep the knees apart.



Having taken the child into the sitting position, lift him or her and hold like this:

First, place his or her arms over your shoulders and then part the legs to put around your waist. As the child learns to balance, gradually reduce your support. This not only encourages further development of balance but allows the child to look around at the environment.

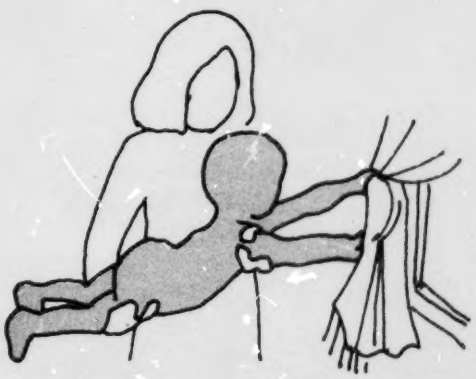
The spastic child with strong extensor spasms may be easier to lift if you roll him or her slightly to one side. This will make it easier to bring the head and shoulders forward and bend the hips. Note: Your forearm should be just above the base of the student's skull, not higher up on the head.

A SIMPLE WAY OF CARRYING A SPASTIC CHILD

The student's legs are bent and turned out by the grip illustrated; your forearms will stop the shoulders from pushing down and at the same time will keep them forward. Keep the hips bent and pulled toward you, back forward and away from you.

CARRYING THE SPASTIC CHILD WHO IS PREDOMINANTLY FLEXED

This position allows you to straighten the child's back while at the same time stopping the pulling down and bending of the arms. Keeping the legs apart lessens the tendency for the child to bend at the hips and cross the legs.

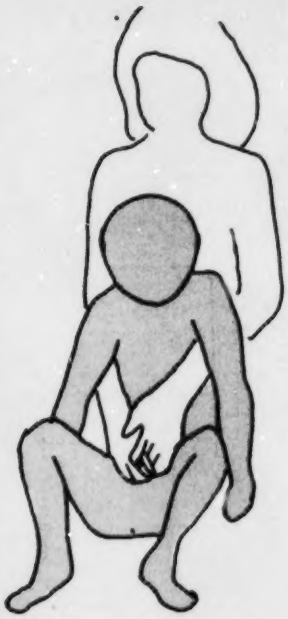


This is a more active position, facilitating the lifting of the head, extension of the back, and reaching out of both arms, enabling the child to explore the surroundings while being carried.

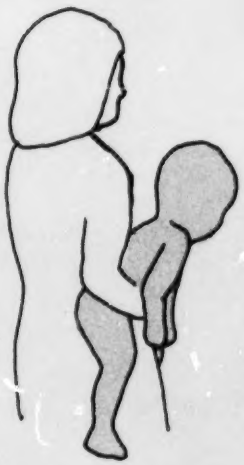
CARRING A HEAVY SEVERELY INVOLVED SPASTIC CHILD

Keep the child's arms over your shoulder and hold the legs high up on the thighs. This will keep the legs apart and turned out, and make carrying easier.

LIFTING AND CARRYING AN ATHETOID OR "FLOPPY" CHILD

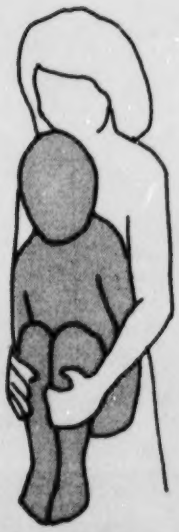


An athetoid child lying on his or her back often has legs and hips bent but head, shoulders, and arms pressed back, and spine often stiff. Lift him or her by placing your arms under the child's arms, your hands on the body as illustrated. By pressing your hands gently in and at the same time pushing with your forearms, the child's head and arms will come forward.



Carrying a young athetoid child in this manner facilitates both flexion and stability at the hips. By having the child lean slightly forward and placing a hand on the chest, you are able to keep the arms forward. This will facilitate the extension of the head and back while the hips remain bent.

A SIMPLE WAY OF CARRYING AN ATHETOID OR "FLOPPY" CHILD



Bring the child's arms forward, your forearms in front of his or her arms; hold the child's hands over the lower part of his or her knees. The legs should be bent and held together. Keep the hips bent and pulled toward you, back forward and away from you.

Types of Wheelchair Transfers

The following section describes some typical wheelchair transfers as well as some safety rules. Again, if you have access to a physical or occupational therapist, consult him or her before trying these transfers.

Two-Person Transfer

This is probably the most common wheelchair transfer. One person holds the child under the arms and around the chest; the second holds him or her under the knees. Make sure the child's arms are crossed or close to the chest (you may have to hold them). Do not lift or pull the child by the arms or feet.

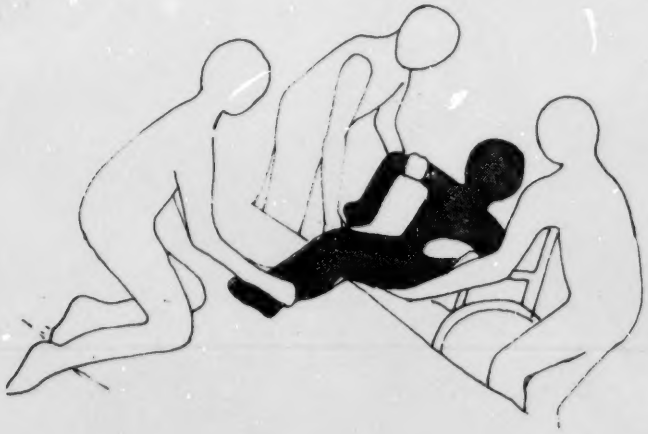
Three-Person Transfer

This is the same as the two-person transfer, but with an additional person supporting and lifting at the child's hips. This is particularly useful for heavy children, especially when lifting them from the floor to a chair.

Pivot Transfer

This is one way for a person to transfer a child alone. Position the wheelchair so that it is at right angles with the surface you wish to put the child on. If the child has a stronger side, position the chair so that you will be moving in the direction of the stronger side. Remove arm and leg rests if necessary. Bend your knees, wrap your arms around the child's chest or waist, and pivot him or her over to the mat, floor, chair, etc. Do not pull the child by the arms.

Front-On Transfer



This is useful for transferring a heavy child to a mat or other surface that is the same height as the seat of the wheelchair. Position the wheelchair so that it faces the surface you want to put the child on. Place the child's feet on the surface and slide the wheelchair as close as possible; you may want to remove the wheelchair leg rests. One person on either side holds the child around the chest and under the knees and then together they slide the child forward. You may need a third person to slide the child's feet over the surface to prevent their sticking on the mat. To transfer back, simply reverse the process, but make sure the child is in a sitting position before attempting to place him or her in the chair.

For All Transfers:

1. If there is a physical or occupational therapist available, consult with him or her as to the best way or ways to transfer certain students. (There may be several ways to safely transfer any one student depending on the situation and the people doing the transfer.)

2. Before transferring anyone, know where you are going and place the wheelchair as close as possible to avoid carrying the child for long distances.

3. When two or more people are transferring a student, it is a good idea for one person to count out loud "one, two, three," so that everyone is lifting at the same time.

4. Always use good body mechanics: bend your knees, use your legs, not your back. Ask for help when you need it.

5. Be sure wheelchair brakes are locked and safety belt and all positioning equipment is removed before attempting to lift the student.

6. When transferring a student back to a wheelchair, properly replace positioning equipment such as pillows, sandbags, splints, etc. in the chair. These are used both for comfort and to help prevent deformity.

7. When placing a student in a wheelchair, make sure the hips are pushed firmly against the back of the chair and that the student is sitting equally well on both buttocks.

8. When transferring a student with multiple deformities or extraneous movements, it is important to make sure you provide maximum support to all limbs, the trunk, and head and that a limb does not get caught in a wheelchair arm or leg rest.

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L.A. Krames, M.D., Publisher
Order from:
Physicians Art Service, Inc.
345-G Serramonte Plaza
Daly City, California 94015

Care of the Back, Industrial Edition 2
William K. Ishmael, M.D., F.A.C.P.
Order from:
J.B. Lippincott Co., Publisher
Rittenhouse Square
Philadelphia, Pennsylvania 19107

Handling the Young Cerebral Palsied Child at Home
Nancie Finnie
Order from:
E.P. Dutton and Co., Inc.
2 Park Avenue
New York, New York 10003

The Low Back Patient
Jean La Freniere, R.P.T.
Order from:
Masson Publishing USA, Inc.
14 East 60th Street
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Pivot Transfer
L.V. McDaniel
Rancho Los Amigos Hospital, Inc. CA.
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